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The University of Chicago Booth School of Business

Assessing Real Estate Returns by Strategy: Core *v.* Value-Added *v.* Opportunistic*

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* Superior research support provided by Camilo Varela

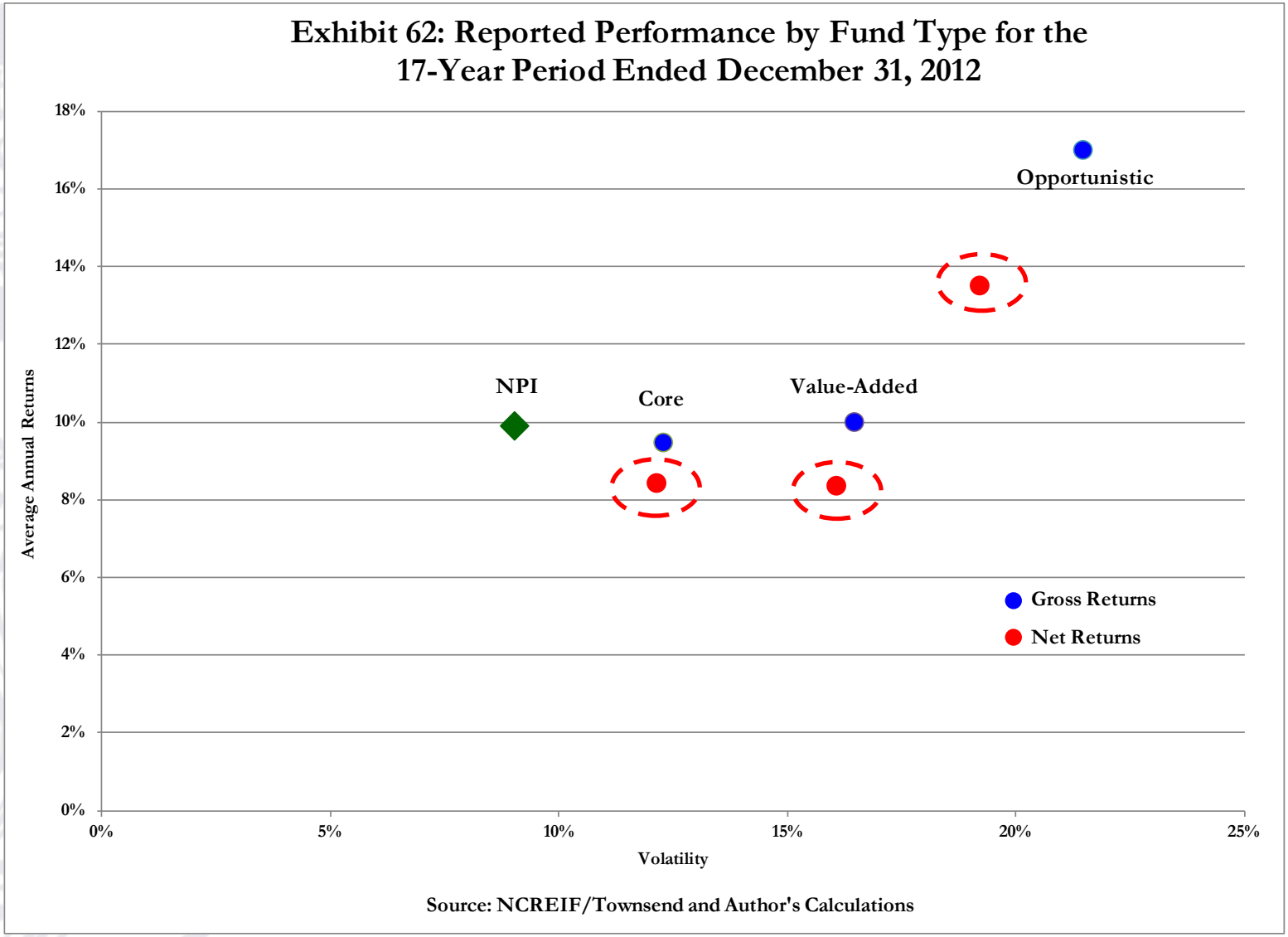
Core *v.* Non-Core Real Estate Returns

- **What Do the Data Look Like?**
- **Promotes Create Asymmetries**
- **The Law of One Price**
- **Putting the Tools to Work: The Results**
- **Holding-Period Sensitivities**
- **Appendices**
  - **Other Sensitivities**
  - **Dispersion in Fund Returns**

Based on the PREA-Sponsored research paper: "An Overview of Fee Structures in Real Estate Funds and Their Implications for Investors" *

*** Draft version of the PREA paper will be available on the Conference website.**

Gross & Net Returns by Strategy



Let's Consider Fees by Strategy

Exhibit 63: Reported Performance by Fund Type for the 17-Year Period Ended December 31, 2012

	Gross (Value-Weighted) Returns				Net (Value-Weighted) Returns		
	Core		Non-Core		Core	Non-Core	
Year	NPI	NFI-ODCE	Value-Added	Opportunistic	NFI-ODCE	Value-Added	Opportunistic
Arithmetic Average							
1996-2006	12.56%	12.90%	15.00%	24.19%	11.81%	13.40%	20.27%
1996-2012	9.92%	9.49%	10.02%	17.02%	8.45%	8.38%	13.53%
%Δ	(21.05%)	(26.41%)	(33.21%)	(29.64%)	(28.45%)	(37.46%)	(33.23%)
Standard Deviation							
1996-2006	4.16%	4.74%	6.72%	16.20%	4.67%	6.18%	13.68%
1996-2012	9.01%	12.27%	16.45%	21.45%	12.12%	16.05%	19.19%
%Δ	116.86%	158.84%	144.75%	32.42%	159.51%	159.56%	40.30%

Strategy	**GP Fees**
Core	~105 bps
Value-Added	~165 bps
Opportunistic	~350 bps

Volatility of Opp Fund Returns Looks Understated

Exhibit 63: Reported Performance by Fund Type for the 17-Year Period Ended December 31, 2012

	Gross (Value-Weighted) Returns				Net (Value-Weighted) Returns		
	Core		Non-Core		Core	Non-Core	
Year	NPI	NFI-ODCE	Value-Added	Opportunistic	NFI-ODCE	Value-Added	Opportunistic
Arithmetic Average							
1996-2006	12.56%	12.90%	15.00%	24.19%	11.81%	13.40%	20.27%
1996-2012	9.92%	9.49%	10.02%	17.02%	8.45%	8.38%	13.53%
%Δ	(21.05%)	(26.41%)	(33.21%)	(29.64%)	(28.45%)	(37.46%)	(33.23%)
Standard Deviation							
1996-2006	4.16%	4.74%	6.72%	16.20%	4.67%	6.18%	13.68%
1996-2012	9.01%	12.27%	16.45%	21.45%	12.12%	16.05%	19.19%
%Δ	116.86%	158.84%	144.75%	32.42%	159.51%	159.56%	40.30%

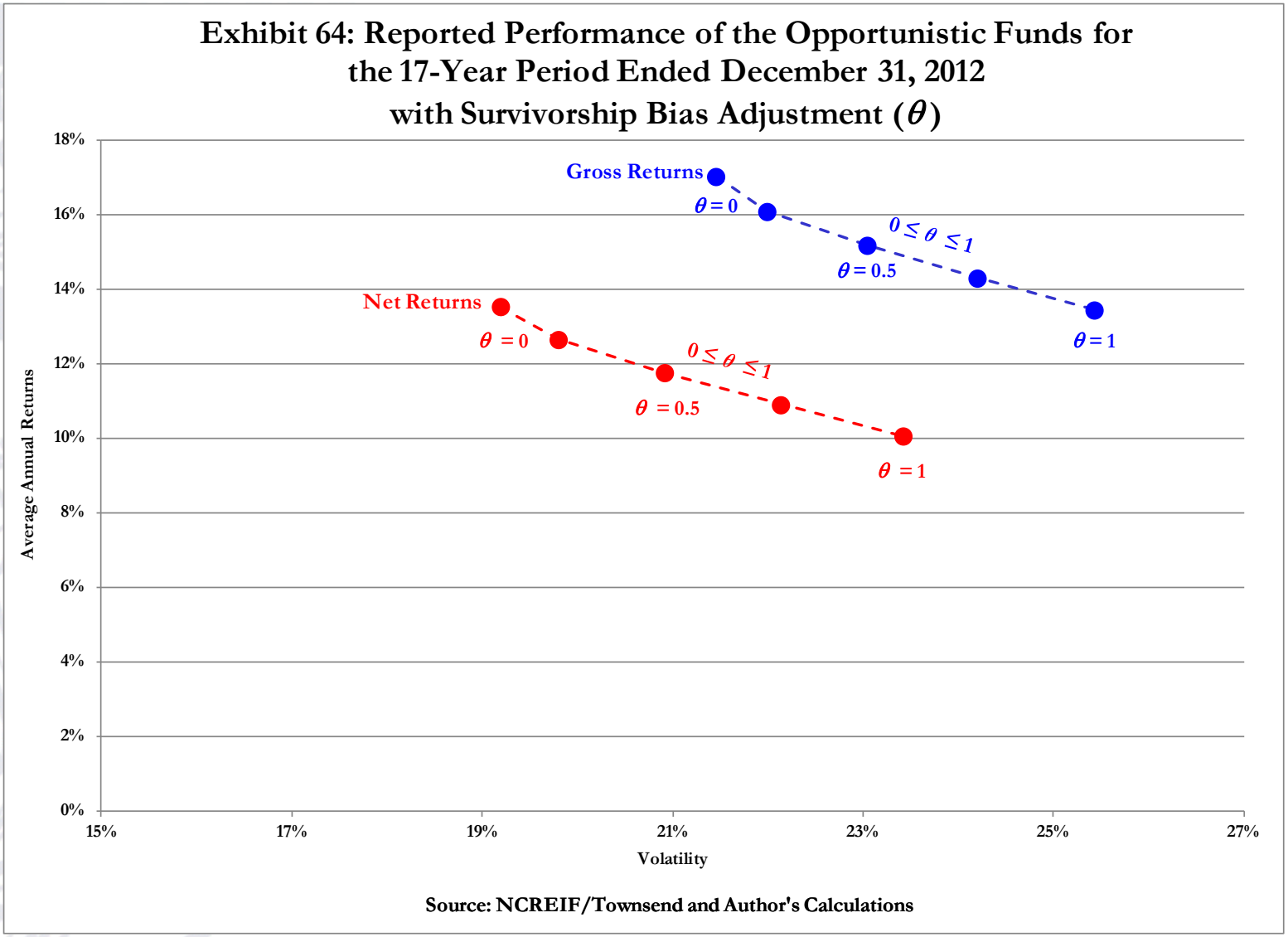
Pre-Financial Crisis

Entire Time Period

Problems with the Data for Non-Core Returns

- Voluntary, Self-Reported Results
- Inconsistent Methodologies for Reporting
- Mark-to-Market Staleness
- Incomplete Capture of Fund Universe
- Incomplete Characterization of Funds:
  - domestic *v.* foreign,
  - debt *v.* equity, *etc.*
- Survivorship Bias ← *only element we can attempt to correct*
  - Survivorship Bias = During & after the financial crisis, some funds stop reporting (without apparent termination)
  - Survivorship Bias Adjustment (θ) = Percentage of assets lost by non-reporting firms

Opp Returns with Survivorship-Bias Adjustment



Survivorship-Bias Adjusted Opp Returns

Exhibit 65: Reported and Adjusted Performance by Fund Type
for the 17-Year Period Ended December 31, 2012

	Gross (Value-Weighted) Returns				Net (Value-Weighted) Returns		
	Core		Non-Core		Core	Non-Core	
Year	NPI	NFI-ODCE	Value-Added	Opportunistic *	NFI-ODCE	Value-Added	Opportunistic *
Arithmetic Average							
1996-2006	12.56%	12.90%	15.00%	24.19%	11.81%	13.40%	20.27%
1996-2012	9.92%	9.49%	10.02%	15.18%	8.45%	8.38%	11.76%
%Δ	**(21.05%)**	**(26.41%)**	**(33.21%)**	**(37.27%)**	**(28.45%)**	**(37.46%)**	**(41.98%)**
Standard Deviation							
1996-2006	4.16%	4.74%	6.72%	16.20%	4.67%	6.18%	13.68%
1996-2012	9.01%	12.27%	16.45%	23.04%	12.12%	16.05%	20.91%
%Δ	**116.86%**	**158.84%**	**144.75%**	**42.22%**	**159.51%**	**159.56%**	**52.90%**

* Adjustment to opportunistic funds, with θ = 50%.

Ultimately, survivorship-bias adjustment does little to cure the suspected problem

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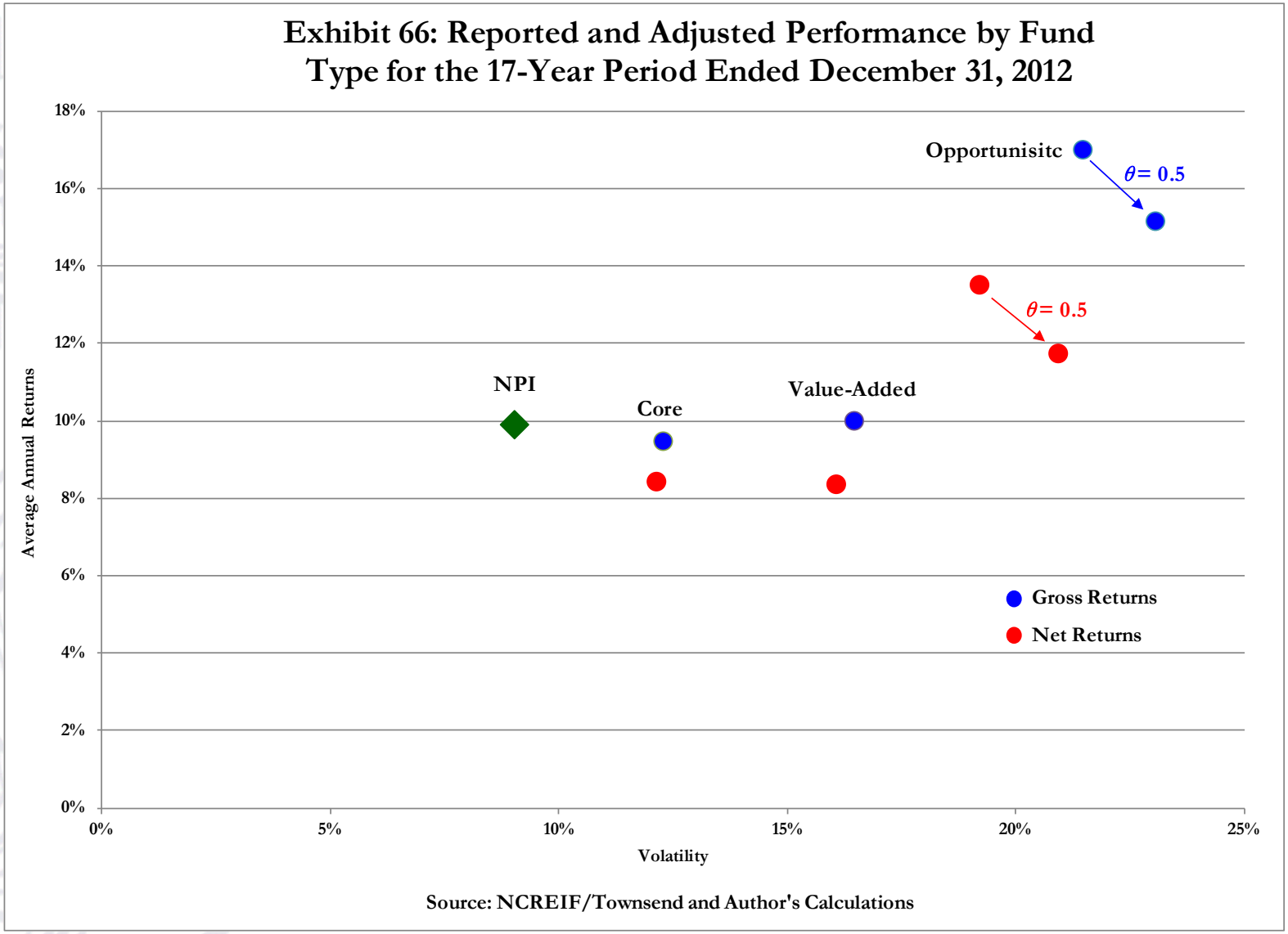
Survivorship-Bias Adjusted Opp Returns in Context



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Numerical Example: Pref & Promote Structure

Fund-Level Return Distribution:

Gross Return	13.0%
Base Fees	1.0%
Net Return	12.0%
Volatility	15.0%

Fund Structure:

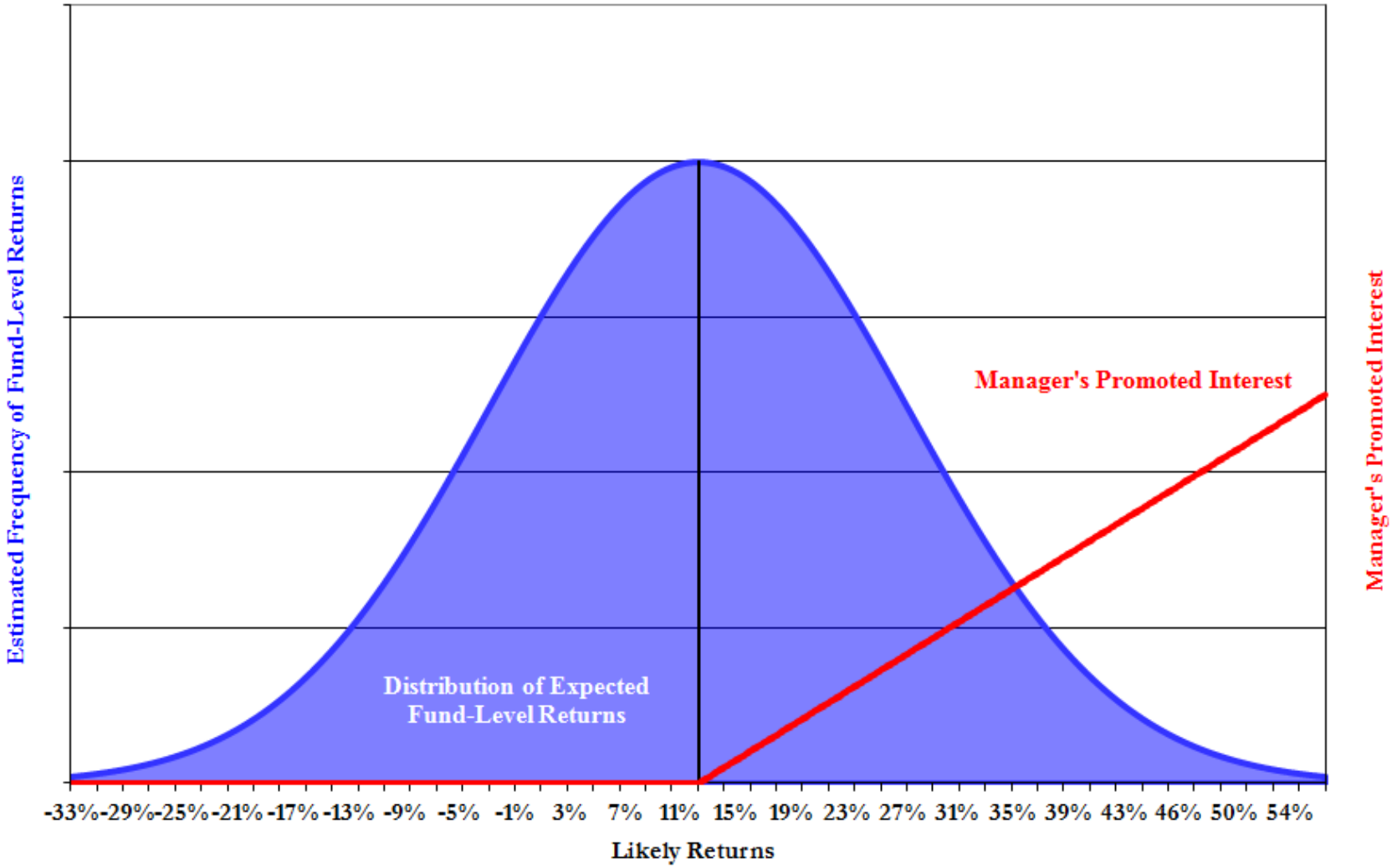
Investor's Preference	12.0%
Residual Split:	
– Investor	80%
– General Partner	20%

Notes:

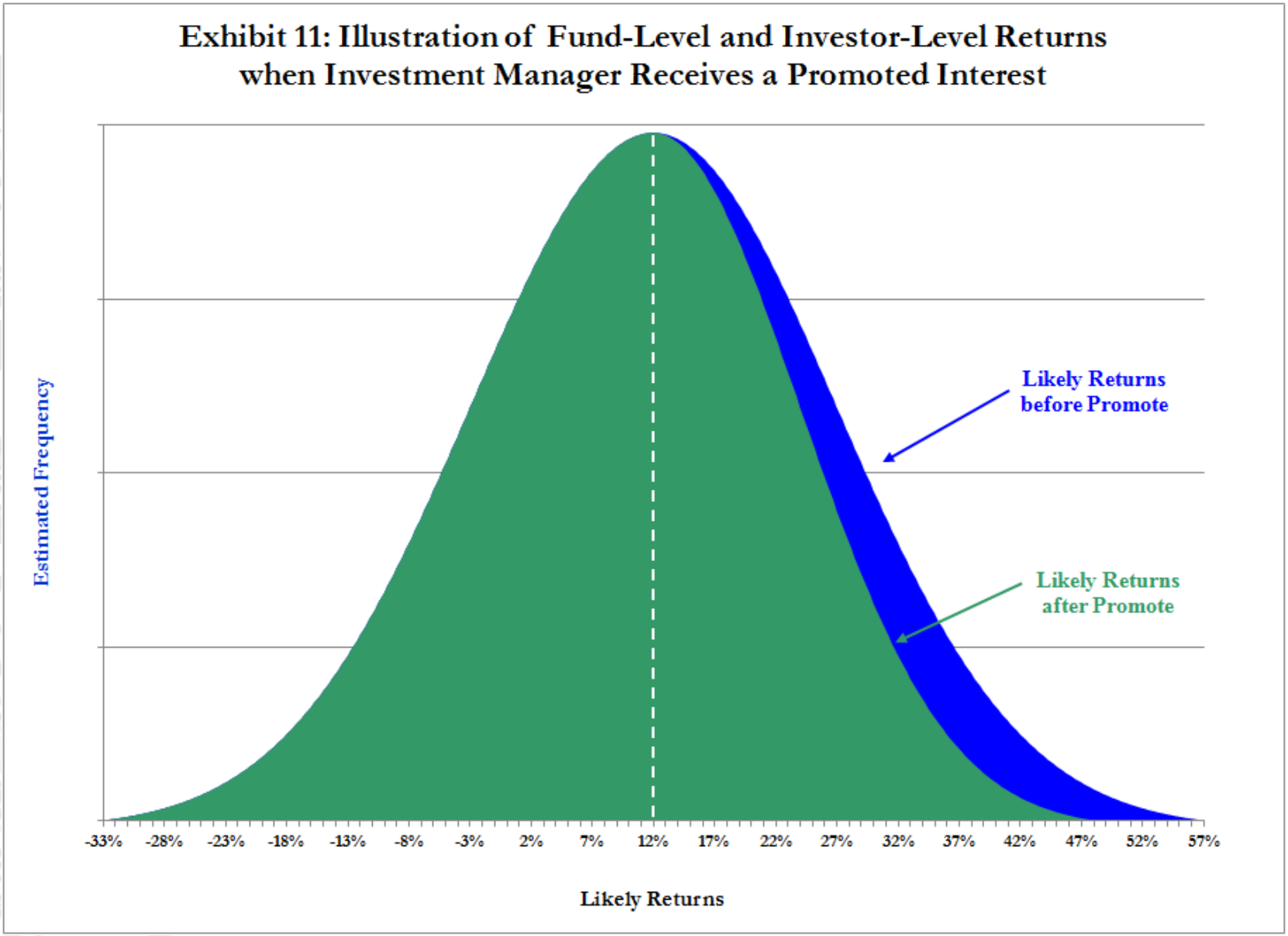
- Investor's preference typically set at or below fund's likely return.
- The general partner's "promoted" interest creates an option-like return for operator.
- The value of the option reduces the investor's upside.

"Promote" → Asymmetric Participation | Contingent Claim

Exhibit 10: Illustration of Expected Fund-Level Returns
with Investment Manager's Promoted Interest



Promotes Truncate the Investor's "Upside" Return



Numerical Example (continued)

Fund's Gross and Net Returns:

- **Likely Returns:**

Gross Return	13.0%
Ongoing/Base Fees	1.0%
Operating Partner's Participation	1.2%
Investor's Net Return	10.8%

- **Volatility (Standard Deviation):**

Fund-Level Volatility before General Partner	15.0%
General Partner's Participation	1.5%
Investor's Net Return	13.5%

Notes:

- The general partner's "promoted" interest reduces the investor's net return by 120 bps:
  - Even though the value of the promote equals zero at the most likely return,
  - This is attributable to general partner's asymmetric participation in returns.
- The reduction in the investor's standard deviation is a statistical illusion:
  - The investor still receives 100% of the economic downside.

Point #1: Average Expectation ≠ Expectation of the Average

A simple way to the think of the average promote:

Exhibit 14: Simple, Two-Outcome Illustration of Asymmetric Payoffs

Outcomes	Probability	Gross Returns	Promote	Net Returns
$Outcome_1$	50%	24.0%	2.4%	21.6%
$Outcome_2$	50%	0.0%	0.0%	0.0%
Average		**12.0%**	**1.2%**	**10.8%**

Note: The appropriate way to calculate the expected promote:

$$E(\pi) = \int_{\psi}^{\infty} \kappa(x-\psi) f(x)\, dx$$

where: π = the "promote", κ = general partner's participation in the excess profits, ψ = investor's preference, and *f*(*x*) = the distribution of fund-level returns, *x*.

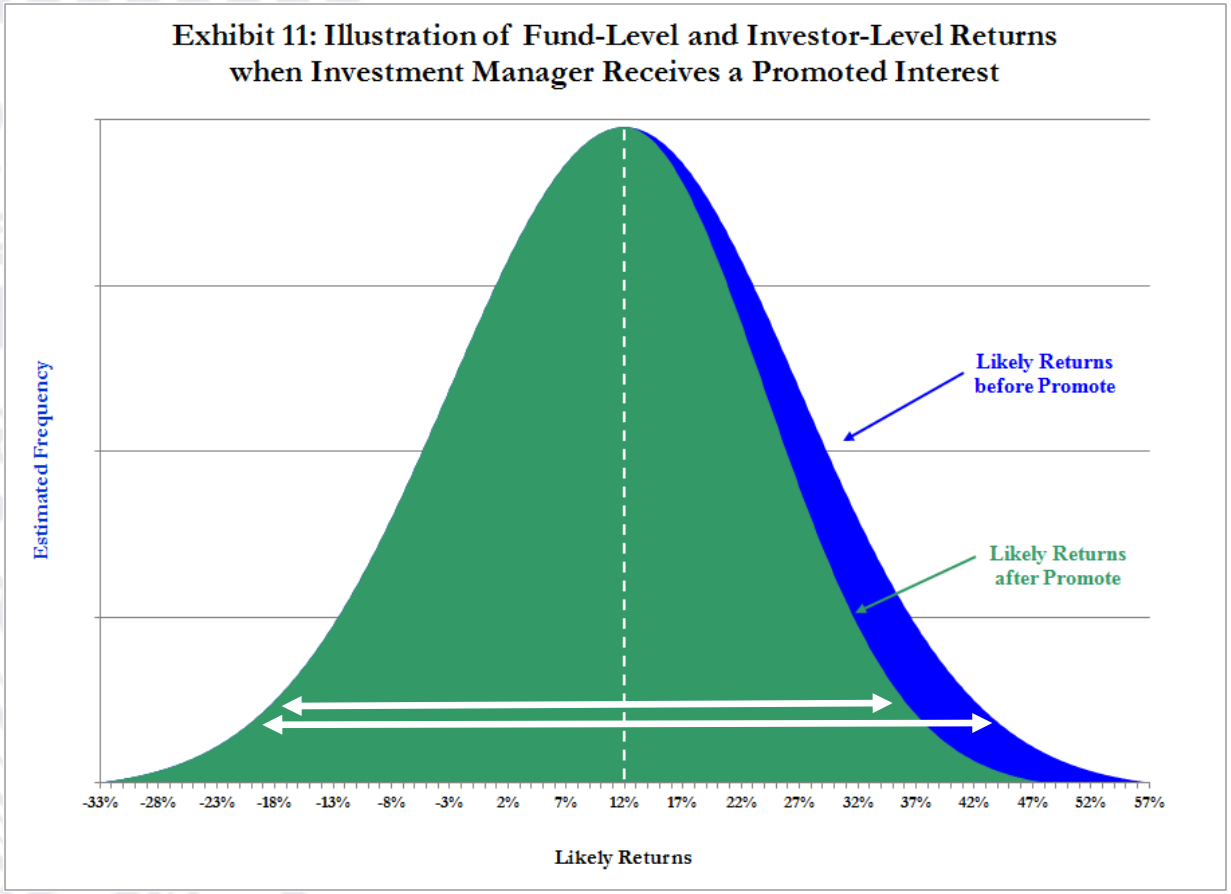
Because of the general partner's asymmetric participation:

- **The average expectation does not equal the expectation of the average :**

$$E(\pi) = \int_{\psi}^{\infty} \kappa(x-\psi) f(x)\, dx \neq \kappa(\bar{x}-\psi)$$

Point #2: Reduction in Volatility of Net Returns ← An Illusion

Mathematically, it is true that the dispersion in net returns is narrower:



However, the investor retains all the "downside" risk

- **Therefore, investor faces the same risk as before the promote**
- **This is an important point when examining index returns by strategy**

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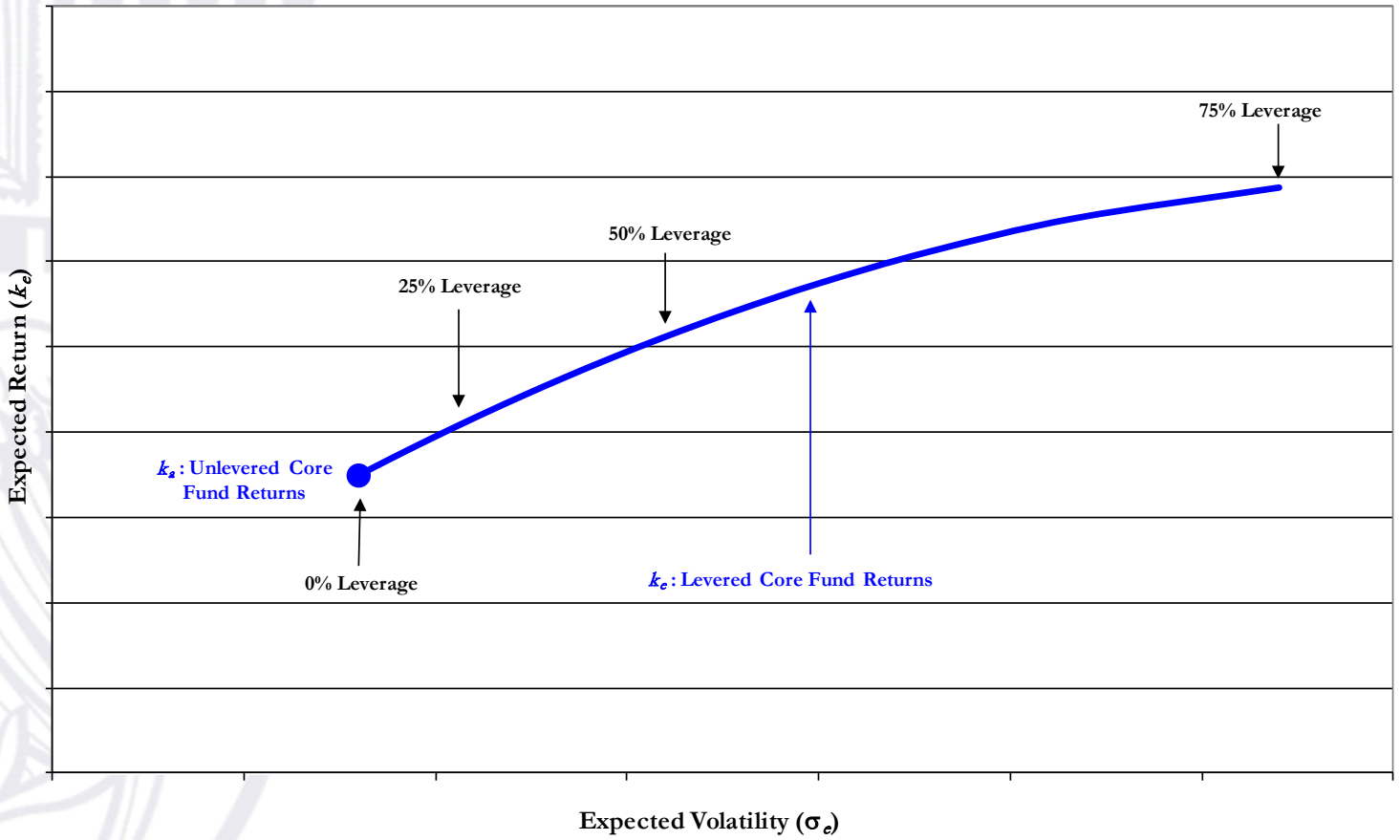
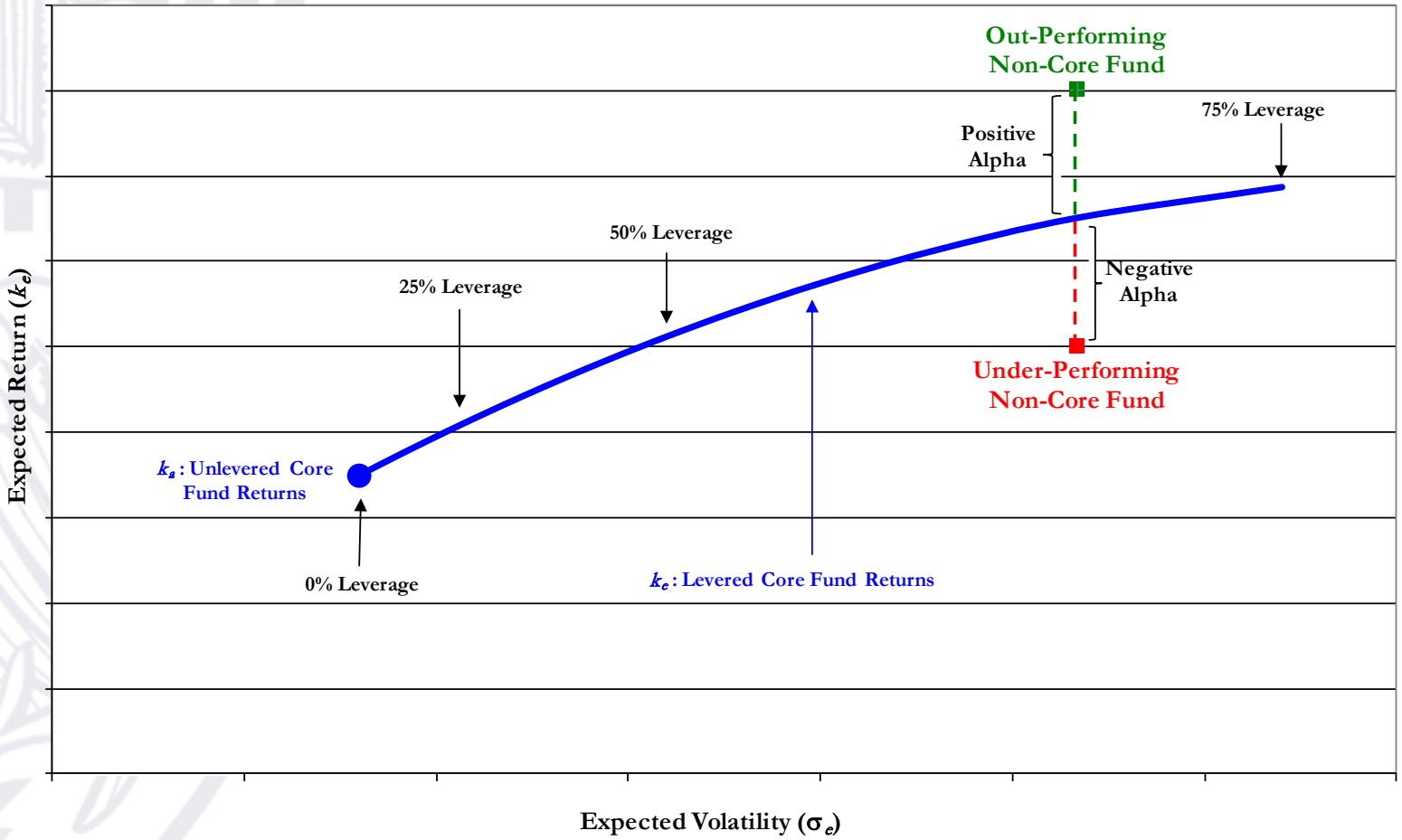
Use the "Law of One Price" to Create Risk/Return Continuum

Exhibit 68: Illustration of "Law of One Price"
Lever Core Assets to Create Risk/Return Continuum

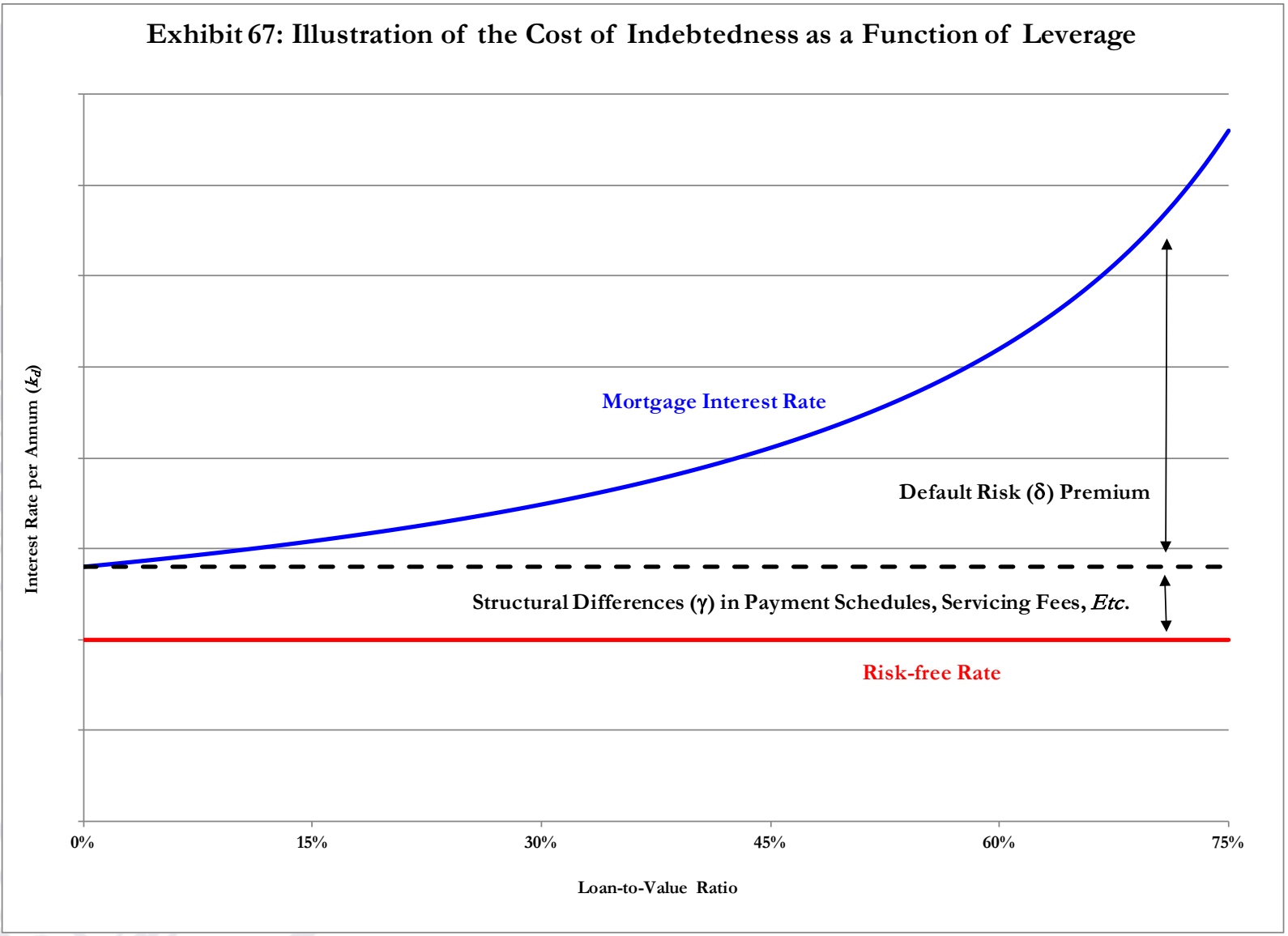


Law of One Price → Risk-Adjusted Returns: "Alpha" (α)

Exhibit 69: Application of "Law of One Price"
Levered Core Assets *v.* Non-Core Funds

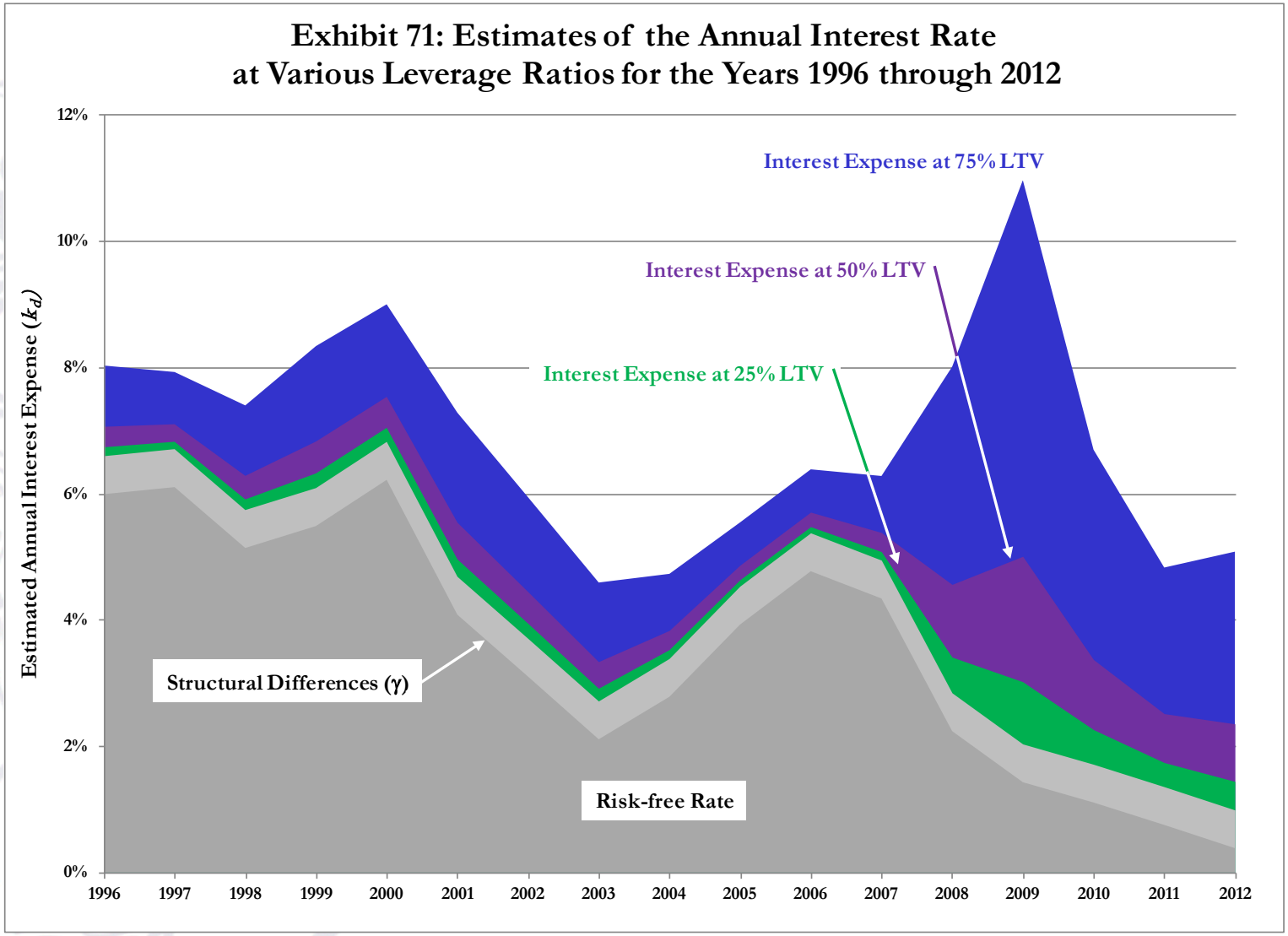


Interest Rates = *f*(LTV | Asset Quality, Sponsorship, *etc.*)



Relationship is for a given moment in time

Risk-Free Rates & Spreads Vary Over Time



Changes Over Time:

1. Risk-free Rate, and
2. Spreads:
   a) low before the financial crisis,
   b) spiked up during and after the financial crisis, and
   c) have started to recede thereafter

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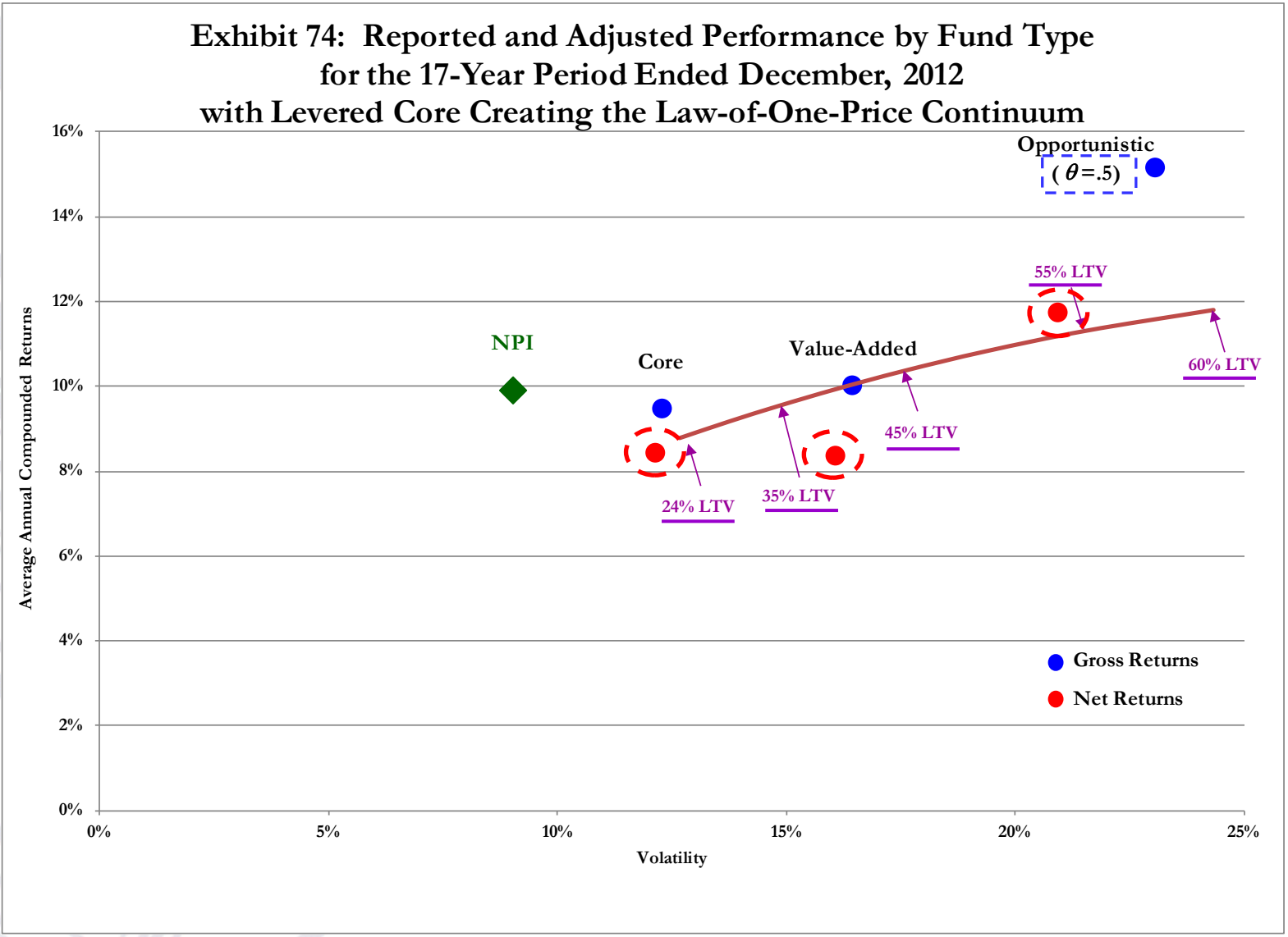
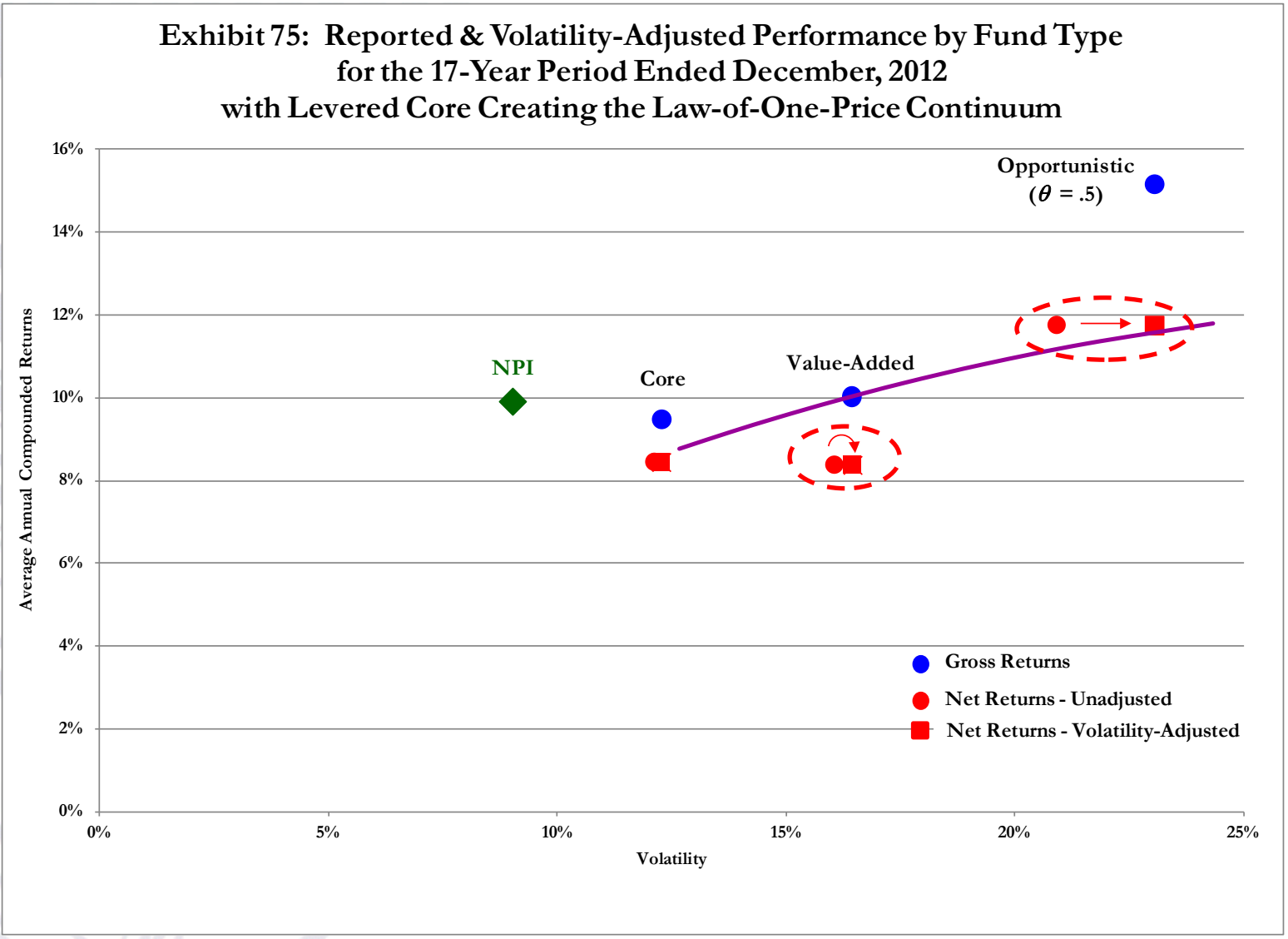
Let's Put the Tools to Work: The Results



Tools:

1. Net Returns,
2. Survivorship Bias (θ), and
3. Law of One Price:
   a) De-lever Core, assume $N = 7$
   b) Re-lever Core, assume $N = 3$

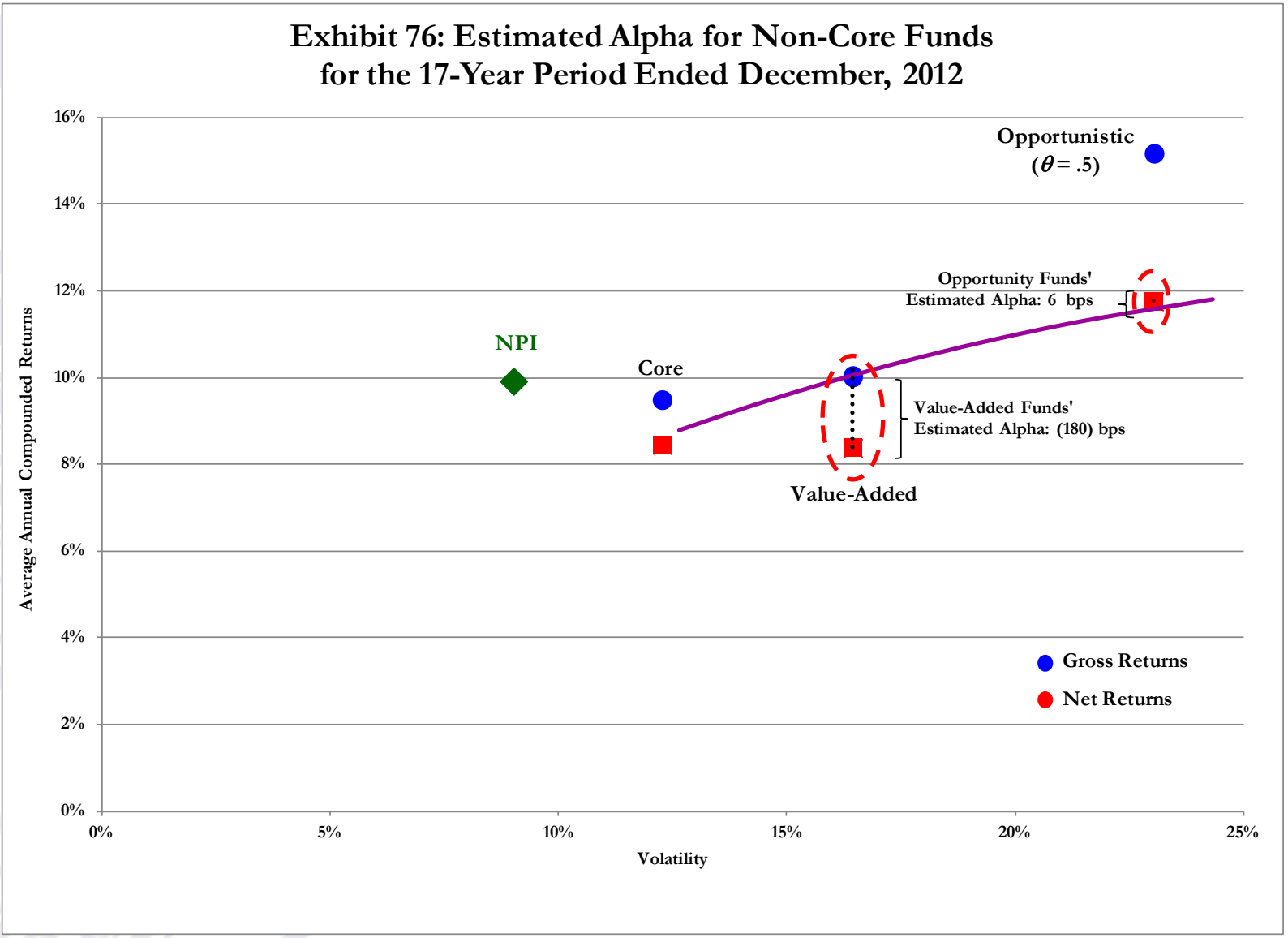
Let's Put the Tools to Work: The Results (continued)



Tools:

4. Volatility Adjustment (correct for statistical illusion)

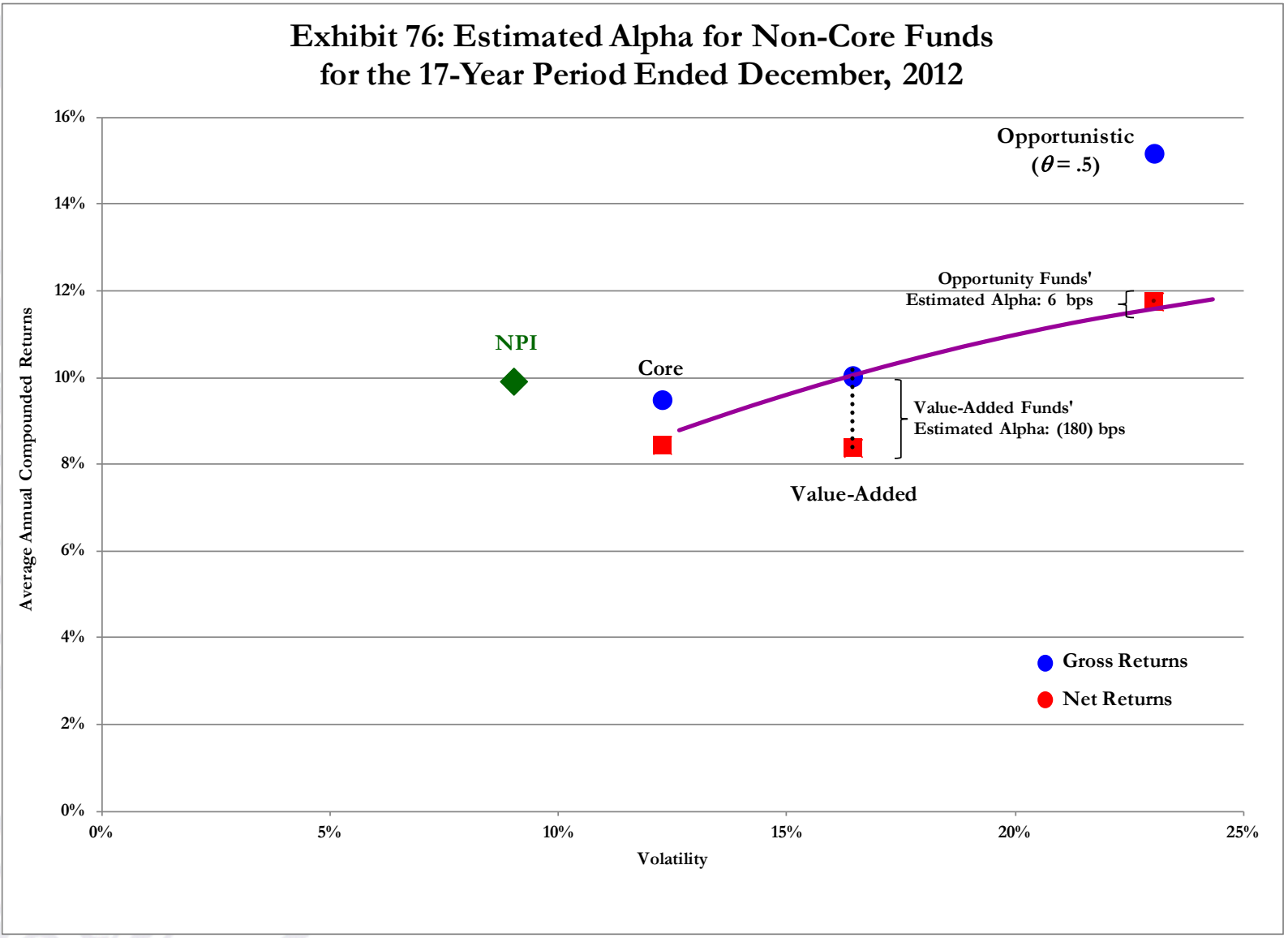
Let's Put the Tools to Work: The Results (continued)



Tools:

5. **Risk-Adjusted Returns (α)**

Let's Put the Tools to Work: The Results (continued)



Results:

For Opportunistic Funds, an "efficient market" type answer : investors receive a "fair" return, while managers receive the "surplus"

For Value-Added Funds, no such answer : dramatic under-performance

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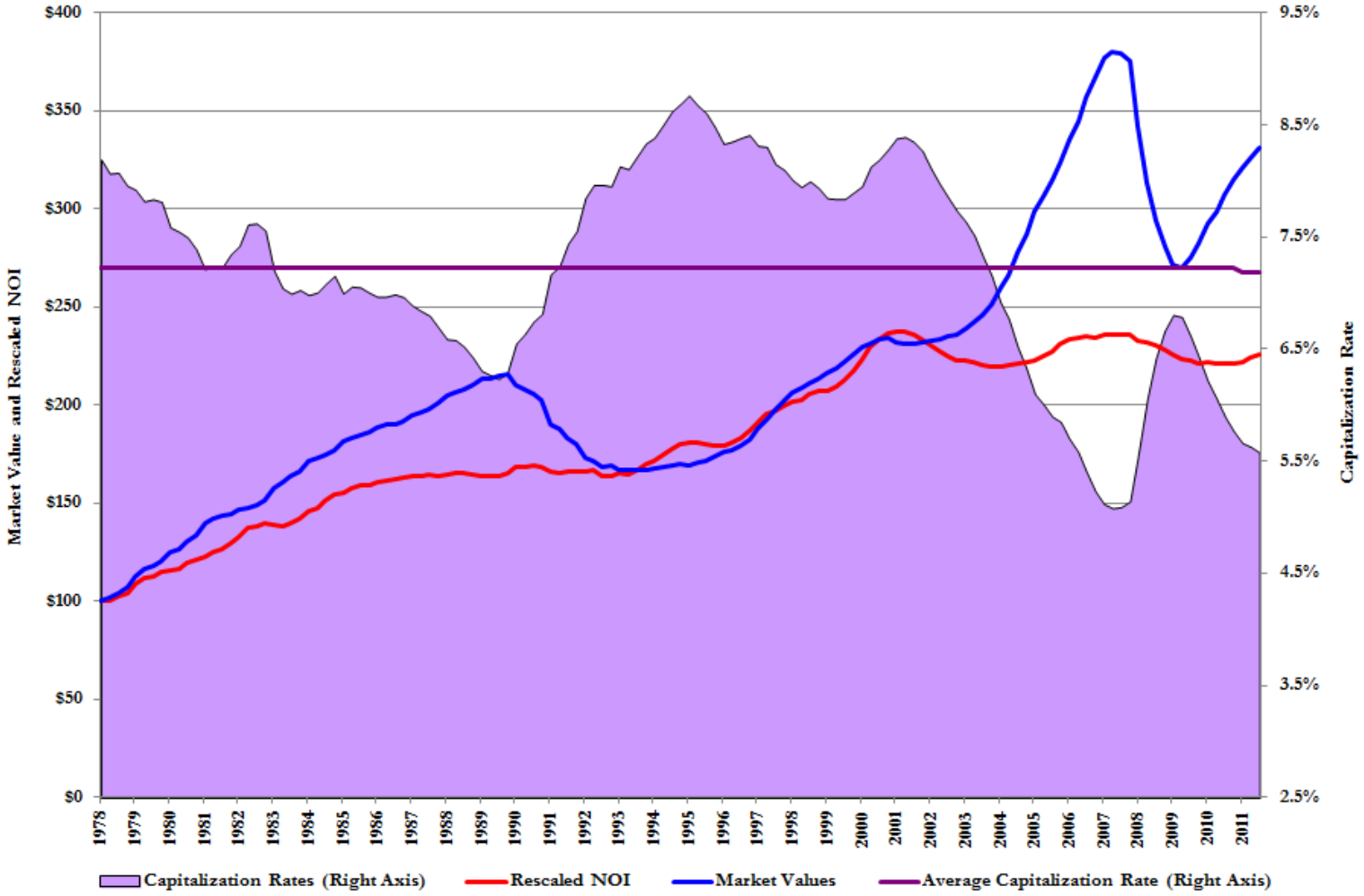
Time-Varying Returns | The Market for Core Assets

Exhibit 77: NCREIF Property Index: Market Values, Rescaled NOI and Capitalization Rates Based on a $100 Investment for the Period 1978 through 2012



Any fair comparison examines a complete market cycle

In a market downturn, there is a "flight to quality" → non-core assets are hit harder

Let's consider returns by "vintage" by strategy

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"Mountain" Chart for Value-Added Index's Alpha

- Repeat the earlier (α) exercise for differing vintages
- Choose any beginning and ending date, with minimum 6-year hold
- Value-add funds underperform before, during & after the financial crisis
  - The pre-financial-crisis underperformance is particularly damning!

Exhibit 78: Value-Added Funds' Estimated Alpha for Various Holding Periods

Incoming Year \ Exiting Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
2007												(3.19%)
2006											(3.05%)	(2.92%)
2005										(2.96%)	(2.74%)	(2.68%)
2004									(1.59%)	(2.45%)	(2.34%)	(2.34%)
2003								(2.82%)	(1.35%)	(2.13%)	(2.07%)	(2.10%)
2002							(1.39%)	(2.50%)	(1.31%)	(2.00%)	(1.97%)	(2.00%)
2001						0.31%	0.06%	(1.62%)	(0.77%)	(1.46%)	(1.47%)	(1.53%)
2000					0.04%	(0.08%)	(0.24%)	(1.83%)	(1.00%)	(1.58%)	(1.58%)	(1.63%)
1999				0.28%	(0.43%)	(0.52%)	(0.65%)	(2.02%)	(1.20%)	(1.70%)	(1.69%)	(1.73%)
1998			NA*	(0.04%)	(1.45%)	(1.56%)	(1.63%)	(2.72%)	(1.88%)	(2.27%)	(2.21%)	(2.21%)
1997		(1.10%)	(0.79%)	(0.95%)	(1.39%)	(1.48%)	(1.59%)	(2.41%)	(1.47%)	(1.87%)	(1.86%)	(1.88%)
1996	(0.89%)	(0.94%)	(0.69%)	(0.87%)	(1.29%)	(1.39%)	(1.48%)	(2.30%)	(1.40%)	(1.77%)	(1.76%)	(1.80%)

Our earlier result

* Not applicable - The reported volatility of the value-added funds during this period is less than that of the core funds for the same period.

"Mountain" Chart for Opportunistic Index's Alpha

- Repeat the earlier (α) exercise for differing vintages
- The index of Opportunistic funds underperforms before the financial crisis
- Yet, they overperform during & after the financial crisis!
  - How can this be? It cannot [=f("flight to quality")]
  - Provides another perspective on data problems & survivorship bias

Exhibit 79: Opportunity Funds' Estimated Alpha for Various Holding Periods

Incoming Year \ Exiting Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
2007												(2.46%)
2006											(2.46%)	(2.86%)
2005										3.96%	0.51%	(0.37%)
2004									7.22%	4.60%	1.52%	0.60%
2003								(0.88%)	6.19%	4.05%	1.39%	0.58%
2002							(3.78%)	(0.32%)	5.46%	3.62%	1.26%	0.53%
2001						0.76%	(1.54%)	0.36%	5.04%	3.42%	1.27%	0.60%
2000					(0.41%)	(0.65%)	(2.47%)	(0.46%)	4.14%	2.78%	0.89%	0.31%
1999				(1.52%)	(2.24%)	(2.38%)	(3.87%)	(1.54%)	3.03%	1.90%	0.24%	(0.25%)
1998			(0.47%)	(2.38%)	(3.71%)	(3.81%)	(4.95%)	(2.53%)	2.18%	1.23%	(0.24%)	(0.66%)
1997		(1.99%)	(1.66%)	(2.27%)	(3.50%)	(3.60%)	(4.68%)	(2.31%)	2.41%	1.52%	0.11%	(0.31%)
1996	(2.00%)	(1.26%)	(1.11%)	(1.64%)	(2.78%)	(2.95%)	(3.93%)	(1.84%)	2.66%	1.82%	0.48%	0.06%

Our earlier result

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The Sensitivity of Survivorship-Bias Adjustment (θ)

Exhibit 81: Opportunity Funds | Sensitivity of Alpha to Assumed Percentage (θ) of Survivorship Bias

Opportunistic Funds' Estimated Alpha, Given θ = 0%

Incoming Year \ Exit Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
2007												1.37%
2006											2.33%	1.37%
2005										8.12%	4.74%	3.45%
2004									11.02%	8.30%	5.34%	4.11%
2003								0.83%	9.52%	7.35%	4.84%	3.78%
2002							(1.92%)	1.13%	8.34%	6.52%	4.33%	3.41%
2001						0.76%	(0.18%)	1.61%	7.57%	5.99%	4.03%	3.21%
2000					(0.41%)	(0.65%)	(1.37%)	0.65%	6.50%	5.19%	3.48%	2.77%
1999				(1.52%)	(2.24%)	(2.38%)	(2.94%)	(0.55%)	5.23%	4.16%	2.67%	2.08%
1998			(0.47%)	(2.38%)	(3.71%)	(3.81%)	(4.18%)	(1.64%)	4.28%	3.40%	2.10%	1.58%
1997		(1.99%)	(1.66%)	(2.27%)	(3.50%)	(3.60%)	(3.96%)	(1.50%)	4.42%	3.59%	2.36%	1.86%
1996	(2.00%)	(1.26%)	(1.11%)	(1.64%)	(2.78%)	(2.95%)	(3.27%)	(1.09%)	4.56%	3.78%	2.62%	2.12%

Opportunistic Funds' Estimated Alpha, Given θ = 50%

Incoming Year \ Exit Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
2007												(2.46%)
2006											(2.46%)	(2.86%)
2005										3.96%	0.51%	(0.37%)
2004									7.22%	4.60%	1.52%	0.60%
2003								(0.88%)	6.19%	4.05%	1.39%	0.58%
2002							(3.78%)	(0.32%)	5.46%	3.62%	1.26%	0.53%
2001						0.76%	(1.54%)	0.36%	5.04%	3.42%	1.27%	0.60%
2000					(0.41%)	(0.65%)	(2.47%)	(0.46%)	4.14%	2.78%	0.89%	0.31%
1999				(1.52%)	(2.24%)	(2.38%)	(3.87%)	(1.54%)	3.03%	1.90%	0.24%	(0.25%)
1998			(0.47%)	(2.38%)	(3.71%)	(3.81%)	(4.95%)	(2.53%)	2.18%	1.23%	(0.24%)	(0.66%)
1997		(1.99%)	(1.66%)	(2.27%)	(3.50%)	(3.60%)	(4.68%)	(2.31%)	2.41%	1.52%	0.11%	(0.31%)
1996	(2.00%)	(1.26%)	(1.11%)	(1.64%)	(2.78%)	(2.95%)	(3.93%)	(1.84%)	2.66%	1.82%	0.48%	0.06%

Opportunistic Funds' Estimated Alpha, Given θ = 100%

Incoming Year \ Exit Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
2007												(6.83%)
2006											(6.83%)	(6.74%)
2005										0.11%	(3.46%)	(3.96%)
2004									3.66%	1.12%	(2.11%)	(2.72%)
2003								(2.38%)	3.06%	0.94%	(1.90%)	(2.47%)
2002							(5.75%)	(1.56%)	2.76%	0.90%	(1.66%)	(2.20%)
2001						0.76%	(2.88%)	(0.70%)	2.71%	1.03%	(1.33%)	(1.85%)
2000					(0.41%)	(0.65%)	(3.66%)	(1.42%)	1.95%	0.51%	(1.57%)	(2.04%)
1999				(1.52%)	(2.24%)	(2.38%)	(4.86%)	(2.40%)	0.95%	(0.25%)	(2.11%)	(2.50%)
1998			(0.47%)	(2.38%)	(3.71%)	(3.81%)	(5.87%)	(3.31%)	0.14%	(0.88%)	(2.54%)	(2.87%)
1997		(1.99%)	(1.66%)	(2.27%)	(3.50%)	(3.60%)	(5.58%)	(3.06%)	0.43%	(0.53%)	(2.11%)	(2.44%)
1996	(2.00%)	(1.26%)	(1.11%)	(1.64%)	(2.78%)	(2.95%)	(4.76%)	(2.53%)	0.79%	(0.14%)	(1.64%)	(1.99%)

Results:

θ = 0

θ = .5
(base case)

θ = 1

As you'd suspect:
$\alpha\downarrow$ as $\theta\uparrow$

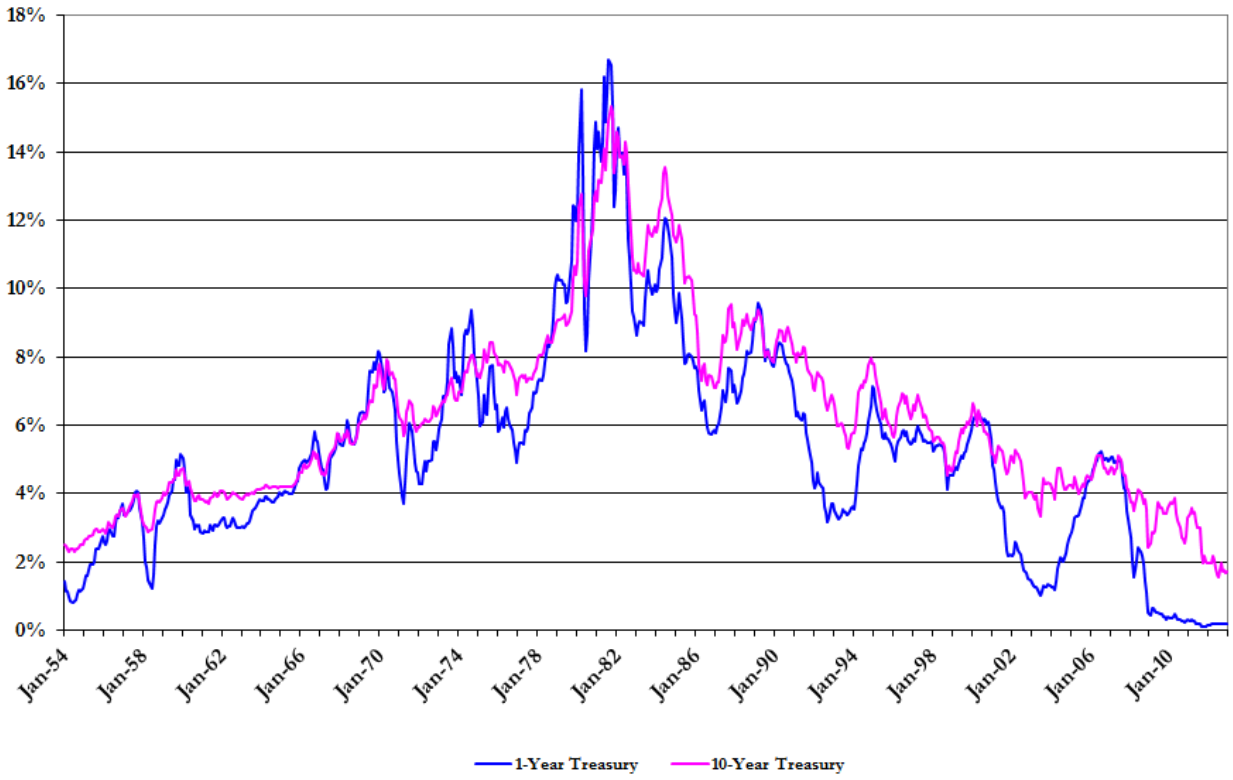
Range ≈ 410 bps

CHICAGO BOOTH

Neutralize Differences in Loan Maturities

- Assume that core funds have longer loan maturities ($N = 7$).
- Assume that non-core funds have shorter maturities ($N = 3$).
- In order to place core funds on equal footing with non-core funds, need to de-lever core funds at their assumed loan maturity and re-lever core funds at the assumed loan maturity of non-core funds.

Exhibit 72: Historical Path of Treasury Bond Interest Rates
for 1- and 10-year Maturities for the Period 1954 through 2012



The Sensitivity of Assumed Core Debt Maturity (N_{Core})

Exhibit 82: Opportunity Funds | Sensitivity of Alpha to Assumed Core Funds' Average Debt Maturity

Opportunistic Funds' Estimated Alpha, Given N_{Core} = 5 Years

Incoming Year \ Exiting Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
2007												(2.22%)
2006											(2.22%)	(2.59%)
2005										4.24%	0.81%	(0.05%)
2004									7.54%	4.89%	1.82%	0.93%
2003								(0.46%)	6.51%	4.35%	1.69%	0.91%
2002							(3.23%)	0.12%	5.77%	3.92%	1.56%	0.86%
2001						1.25%	(1.10%)	0.79%	5.35%	3.71%	1.57%	0.92%
2000					0.01%	(0.21%)	(2.07%)	(0.08%)	4.42%	3.05%	1.16%	0.61%
1999				(1.22%)	(1.83%)	(1.96%)	(3.49%)	(1.18%)	3.29%	2.15%	0.49%	0.03%
1998			(0.30%)	(2.12%)	(3.35%)	(3.41%)	(4.62%)	(2.20%)	2.41%	1.45%	(0.01%)	(0.41%)
1997		(1.81%)	(1.43%)	(2.00%)	(3.17%)	(3.28%)	(4.38%)	(2.00%)	2.63%	1.73%	0.34%	(0.06%)
1996	(1.85%)	(1.08%)	(0.90%)	(1.38%)	(2.48%)	(2.60%)	(3.64%)	(1.54%)	2.87%	2.02%	0.70%	0.30%

Opportunistic Funds' Estimated Alpha, Given N_{Core} = 7 Years

Incoming Year \ Exiting Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
2007												(2.46%)
2006											(2.46%)	(2.86%)
2005										3.96%	0.51%	(0.37%)
2004									7.22%	4.60%	1.52%	0.60%
2003								(0.88%)	6.19%	4.05%	1.39%	0.58%
2002							(3.78%)	(0.32%)	5.46%	3.62%	1.26%	0.53%
2001						0.76%	(1.54%)	0.36%	5.04%	3.42%	1.27%	0.60%
2000					(0.41%)	(0.65%)	(2.47%)	(0.46%)	4.14%	2.78%	0.89%	0.31%
1999				(1.52%)	(2.24%)	(2.38%)	(3.87%)	(1.54%)	3.03%	1.90%	0.24%	(0.25%)
1998			(0.47%)	(2.38%)	(3.71%)	(3.81%)	(4.95%)	(2.53%)	2.18%	1.23%	(0.24%)	(0.66%)
1997		(1.99%)	(1.66%)	(2.27%)	(3.50%)	(3.60%)	(4.68%)	(2.31%)	2.41%	1.52%	0.11%	(0.31%)
1996	(2.00%)	(1.26%)	(1.11%)	(1.64%)	(2.78%)	(2.95%)	(3.93%)	(1.84%)	2.66%	1.82%	0.48%	0.06%

Opportunistic Funds' Estimated Alpha, Given N_{Core} = 10 Years

Incoming Year \ Exiting Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
2007												(2.72%)
2006											(2.72%)	(3.13%)
2005										3.63%	0.20%	(0.68%)
2004									6.89%	4.28%	1.21%	0.29%
2003								(1.30%)	5.88%	3.76%	1.10%	0.28%
2002							(4.02%)	(0.68%)	5.18%	3.36%	0.99%	0.26%
2001						0.57%	(1.70%)	0.06%	4.80%	3.18%	1.03%	0.36%
2000					(0.54%)	(0.80%)	(2.64%)	(0.73%)	3.93%	2.57%	0.68%	0.09%
1999				(1.59%)	(2.35%)	(2.50%)	(4.02%)	(1.79%)	2.84%	1.70%	0.04%	(0.46%)
1998			(0.49%)	(2.43%)	(3.78%)	(3.91%)	(5.07%)	(2.76%)	2.00%	1.05%	(0.44%)	(0.86%)
1997		(1.99%)	(1.68%)	(2.32%)	(3.56%)	(3.73%)	(4.79%)	(2.52%)	2.24%	1.34%	(0.06%)	(0.50%)
1996	(2.00%)	(1.28%)	(1.15%)	(1.69%)	(2.84%)	(3.03%)	(4.03%)	(2.04%)	2.50%	1.64%	0.30%	(0.12%)

Results:

N_{Core} = 5

N_{Core} = 7 (base case)

N_{Core} = 10

As you'd suspect:
$\alpha\downarrow$ as $N_{core}\uparrow$

Range ≈ 40 bps

CHICAGO BOOTH

The Sensitivity of Assumed Core Debt Maturity (N_{Opp})

Exhibit 83: Opportunity Funds | Sensitivity of Alpha to Assumed Opportunity Funds' Average Debt Maturity

Opportunistic Funds' Estimated Alpha, Given $N_{Opportunity}$ = 2 Years

Incoming Year \ Exiting Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
2007												(2.73%)
2006											(2.73%)	(3.18%)
2005										3.95%	0.23%	(0.72%)
2004									7.14%	4.42%	1.13%	0.17%
2003								(1.41%)	5.87%	3.69%	0.87%	0.03%
2002							(6.55%)	(1.28%)	4.94%	3.09%	0.60%	(0.13%)
2001						(1.26%)	(3.27%)	(0.53%)	4.54%	2.90%	0.64%	(0.04%)
2000					(2.26%)	(2.33%)	(4.00%)	(1.19%)	3.72%	2.34%	0.35%	(0.26%)
1999				(2.96%)	(3.94%)	(3.99%)	(5.31%)	(2.26%)	2.61%	1.46%	(0.30%)	(0.81%)
1998			(1.03%)	(3.66%)	(5.36%)	(5.37%)	(6.41%)	(3.24%)	1.76%	0.79%	(0.77%)	(1.21%)
1997		(2.86%)	(2.71%)	(3.63%)	(5.07%)	(5.19%)	(6.14%)	(3.02%)	1.99%	1.09%	(0.40%)	(0.83%)
1996	(2.36%)	(2.15%)	(2.19%)	(2.96%)	(4.28%)	(4.42%)	(5.34%)	(2.54%)	2.25%	1.39%	(0.02%)	(0.47%)

Opportunistic Funds' Estimated Alpha, Given $N_{Opportunity}$ = 3 Years

Incoming Year \ Exiting Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
2007												(2.46%)
2006											(2.46%)	(2.86%)
2005										3.96%	0.51%	(0.37%)
2004									7.22%	4.60%	1.52%	0.60%
2003								(0.88%)	6.19%	4.05%	1.39%	0.58%
2002							(3.78%)	(0.32%)	5.46%	3.62%	1.26%	0.53%
2001						0.76%	(1.54%)	0.36%	5.04%	3.42%	1.27%	0.60%
2000					(0.41%)	(0.65%)	(2.47%)	(0.46%)	4.14%	2.78%	0.89%	0.31%
1999				(1.52%)	(2.24%)	(2.38%)	(3.87%)	(1.54%)	3.03%	1.90%	0.24%	(0.25%)
1998			(0.47%)	(2.38%)	(3.71%)	(3.81%)	(4.95%)	(2.53%)	2.18%	1.23%	(0.24%)	(0.66%)
1997		(1.99%)	(1.66%)	(2.27%)	(3.50%)	(3.60%)	(4.68%)	(2.31%)	2.41%	1.52%	0.11%	(0.31%)
1996	(2.00%)	(1.26%)	(1.11%)	(1.64%)	(2.78%)	(2.95%)	(3.93%)	(1.84%)	2.66%	1.82%	0.48%	0.06%

Opportunistic Funds' Estimated Alpha, Given $N_{Opportunity}$ = 4 Years

Incoming Year \ Exiting Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
2007												(2.27%)
2006											(2.27%)	(2.56%)
2005										4.09%	0.75%	0.01%
2004									7.47%	4.88%	1.86%	1.08%
2003								(0.16%)	6.63%	4.49%	1.86%	1.15%
2002							(2.19%)	0.46%	5.92%	4.07%	1.74%	1.10%
2001						1.92%	(0.59%)	1.01%	5.45%	3.82%	1.70%	1.12%
2000					0.74%	0.36%	(1.64%)	0.10%	4.51%	3.15%	1.29%	0.79%
1999				(0.70%)	(1.18%)	(1.45%)	(3.07%)	(1.03%)	3.37%	2.25%	0.61%	0.20%
1998			(0.23%)	(1.75%)	(2.80%)	(2.93%)	(4.22%)	(2.06%)	2.49%	1.55%	0.10%	(0.25%)
1997		(1.79%)	(1.22%)	(1.62%)	(2.65%)	(2.84%)	(3.99%)	(1.89%)	2.70%	1.82%	0.45%	0.10%
1996	(1.99%)	(1.05%)	(0.68%)	(1.02%)	(2.00%)	(2.19%)	(3.28%)	(1.43%)	2.95%	2.11%	0.80%	0.45%

Results:

$N_{Opp} = 2$

$N_{Opp} = 3$ (base case)

$N_{Opp} = 4$

As you'd suspect:
$\alpha\downarrow$ as $N_{Opp}\uparrow$

Range ≈ 90 bps

CHICAGO BOOTH

Core *v.* Non-Core Real Estate Returns

- What Do the Data Look Like?
- Promotes Create Asymmetries
- The Law of One Price
- Putting the Tools to Work: The Results
- Holding-Period Sensitivities
- Appendices
  - Other Sensitivities
  - Dispersion in Fund Returns

Based on the PREA-Sponsored research paper: "An Overview of Fee Structures in Real Estate Funds and Their Implications for Investors" *

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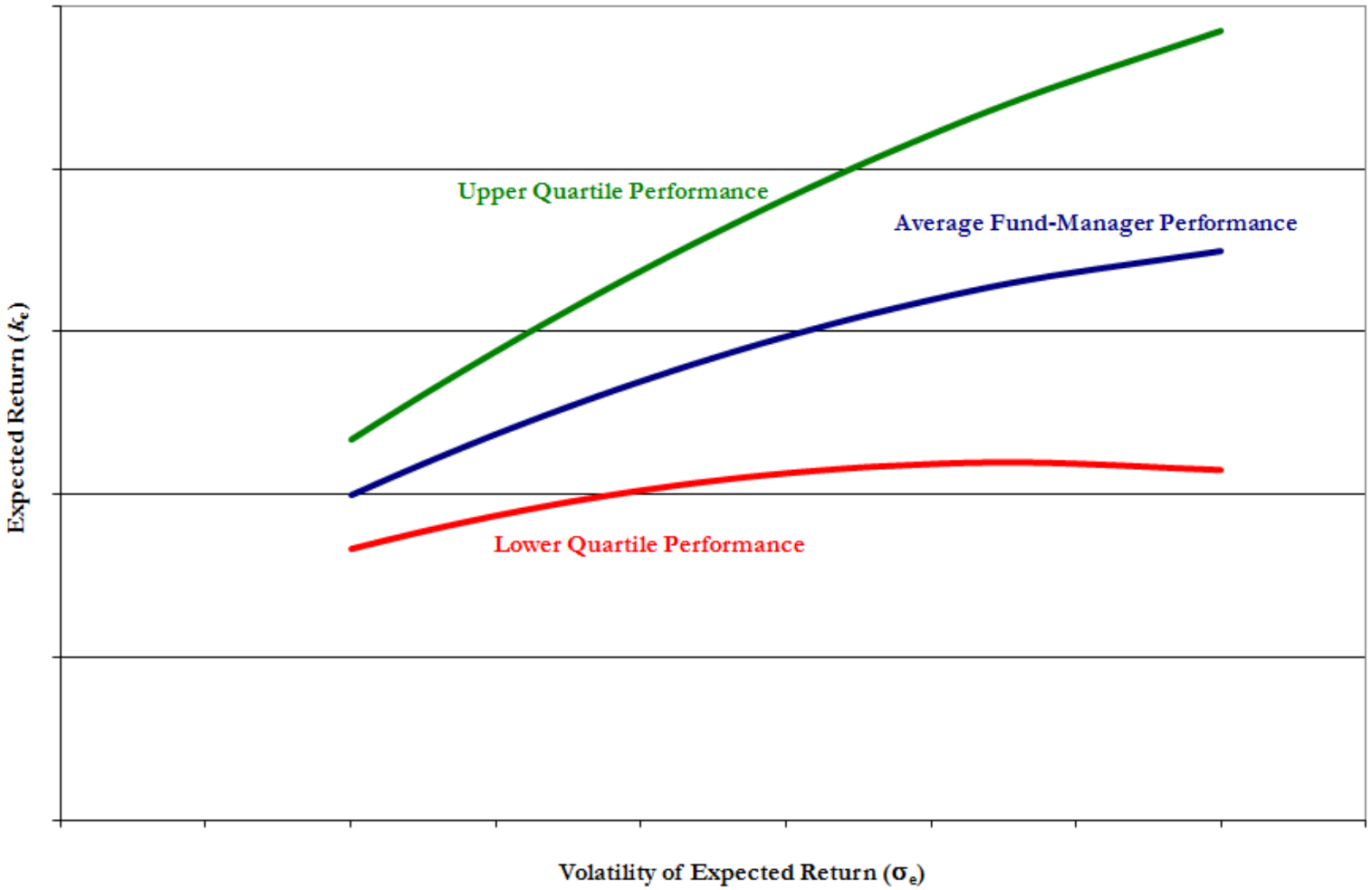
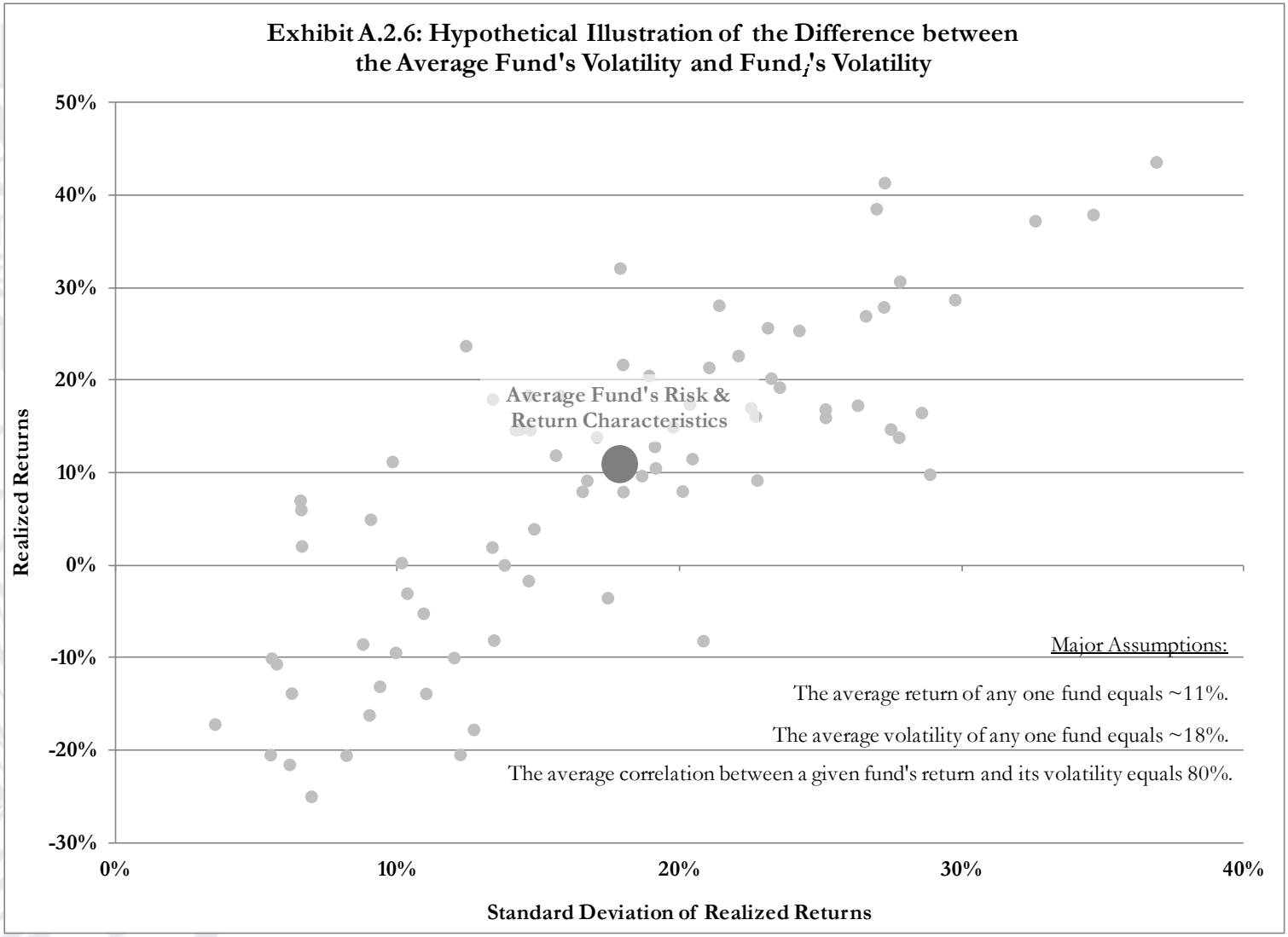
* Draft version of the PREA paper will be available on the Conference website.

Note: An Index *v.* Individual Funds

Exhibit 80: Illustration of Dispersion in Manager-Specific Performance
Gross Returns as a Function of Investment Strategy

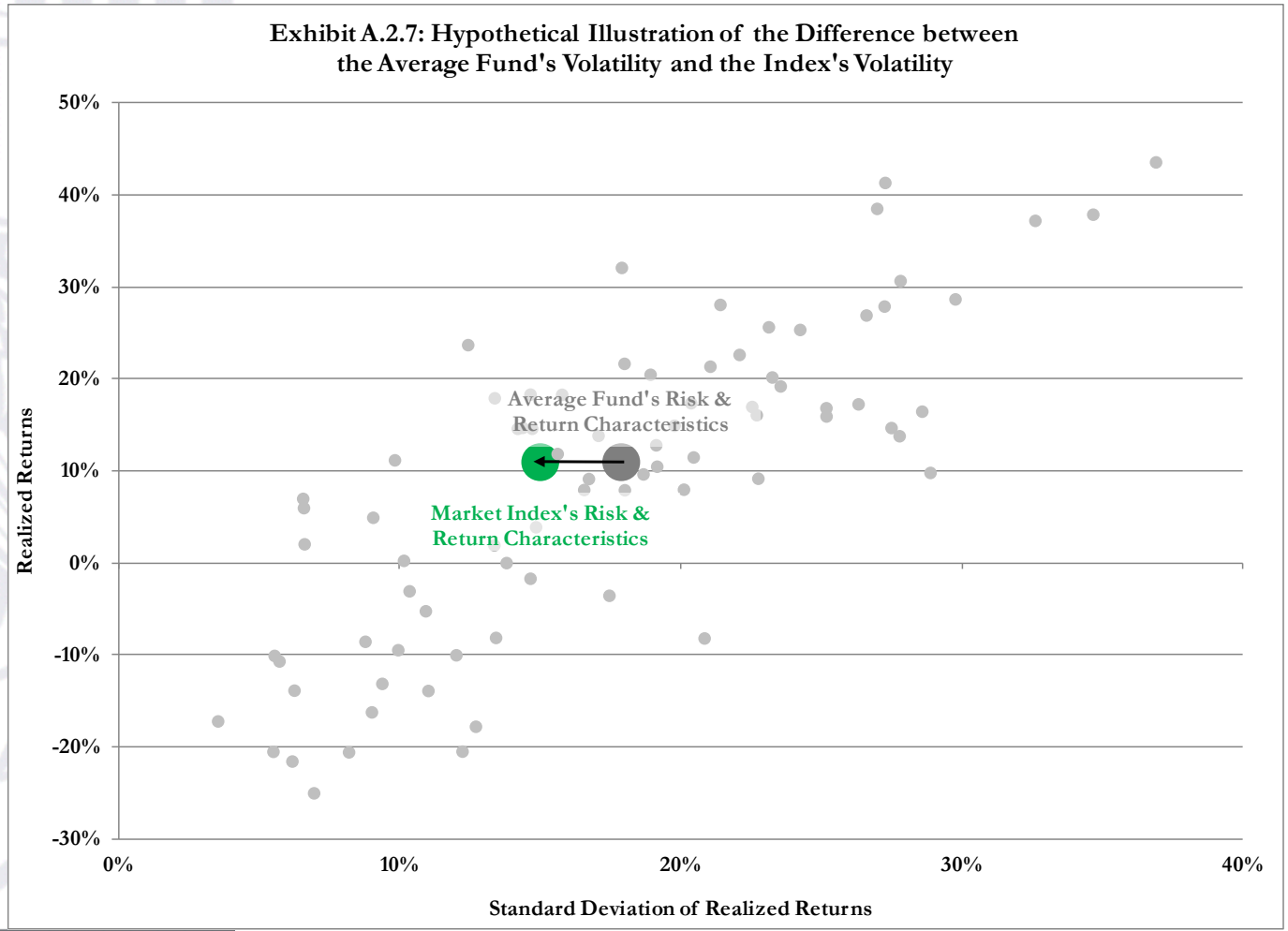


Hypothetical Dispersion in Performance for a Given Strategy



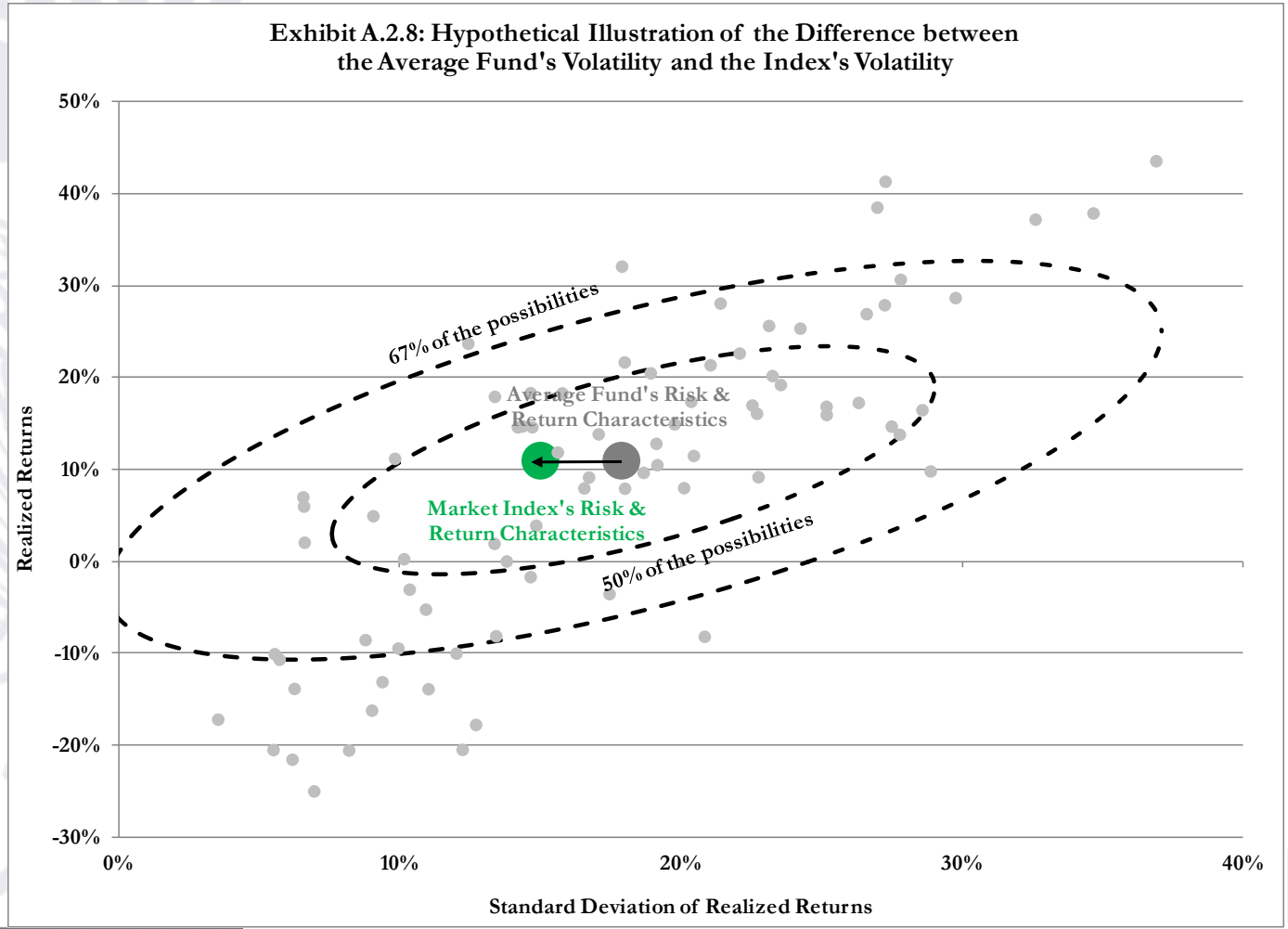
Risk/Return Characteristics: Index *v.* Funds

- The return of the index = the (weighted) average of the funds' returns
- The volatility (σ) of the index < the (weighted) average of the funds' volatility
  - There's a diversification effect (*w.r.t.* to volatility only)



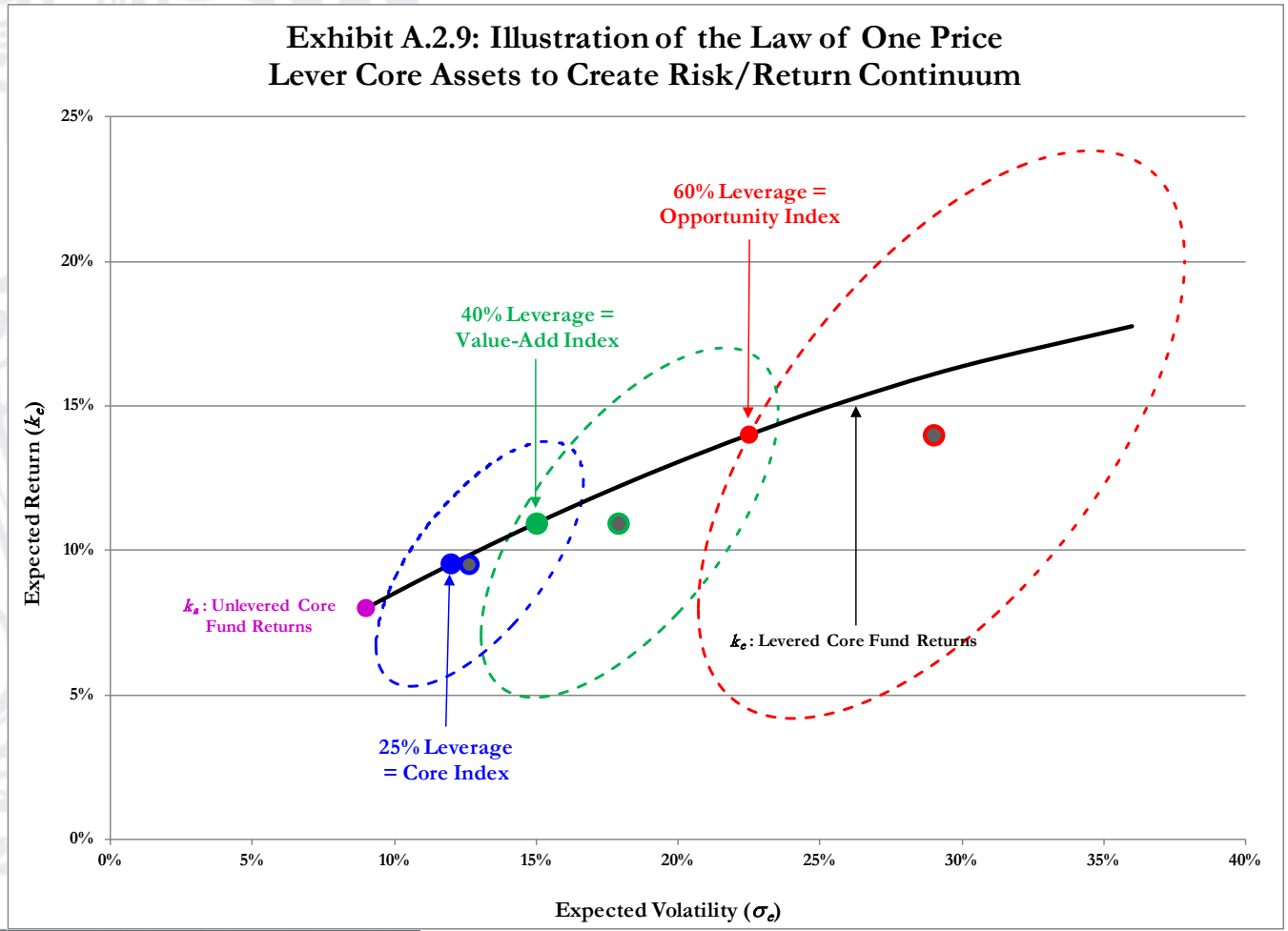
Risk/Return Characteristics: Index *v.* Funds (continued)

- Consider the dispersion around the (weighted) average of the funds' returns
  - not the index's return!
- Each ellipse contains a certain proportion of fund returns:



Risk/Return Characteristics: Index *v.* Funds (continued)

- This diversification effect is greatest with opportunistic funds
  - → biggest difference between index's σ and the average fund's σ
  - → need more opp funds to be well diversified (within that strategy)
- Under-diversified opp-fund investors experience greatest decline in α



To be effectively diversified (*i.e.*, within 50 bps of an index's volatility) and given my underlying assumptions, an investor would need:

- ≥ 2 core funds,
- ≥ 7 value-add funds, &
- ≥ 15 opportunity funds.